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ABSTRACT

A study compared learning disabled (LD) adolescents with oral expressive problems to non-learning-disabled (NLD) adolescents on a formal operations task, with emphasis on a comparison between non-verbal performance and verbal explanations of the task. This paper reports part of the study, a comparison of two high school freshman subjects. The task was to insert 10 rods in a board and to determine why some of the rods bent more easily than others. Each subject participated in the task with the experimenter and then was asked to explain the task to a person who had not been present for the task. While both subjects met the non-verbal criteria of the task, major differences appeared in the verbal behavior. The NLD subject used connectives; the LD subject either used no connectives or used only "and" and "then." With regard to the choice of content, the NLD subject produced a text consistent with an explanatory format, while the LD subject produced a narrative text. Because the LD subject was able to generalize in the non-verbal situation, it could be concluded that the problem lies in the expression of generalizations and a lack of text-structuring devices, not in the lack of the ability to generalize nor in the lack of formal-operations skills. (AMH)

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Text production in adolescence:

Formal operations skill vs. explanation

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Formal operations, according to Inhelder and Piaget (1958), is the stage of cognitive development which begins during adolescence and which they claim is characteristic of adult reasoning. There has been a debate in the literature on formal operations about the type of criterion to use in assessing performance on formal operations tasks. Some researchers have based their assessment on non-verbal or minimal verbal responses (e.g., Stone and Day, 1978; Case, 1974); others (e.g., Kuhn and Brannock, 1977) have considered subjects' extended explanations as the crucial factor for assessment. In general, studies which based assessment of formal operations status on extended explanations found a lower incidence of formal operations in their samples than did studies requiring largely non-verbal responses.

It may be the case that the majority of persons who exhibit formal operations behavior (assessed non-verbally) are also able to give extended explanations consistent with formal operations. This does not mean, however, that an individual cannot be said to have attained the stage of formal operations unless he or she is able to give such explanations. That is, we would not wish to rule out the possibility that a person could have certain abilities, and use them, without being able to talk about these abilities at an equally sophisticated level. Although Piaget himself used a combination of non-verbal and verbal criteria in his studies, Inhelder and Piaget said of their adolescent subjects that "All in all, the subjects' language expresses their thoughts only in a rough way." (1958,

p. 279) Brainerd (1973) analyzed the role assigned to language in Piaget's theory in general and concluded that

> [t]he theory not only fails to justify an explanation criterion, but it makes such a criterion seem highly inappropriate to the task of determining the presence of cognitive structures.... [I]t follows from the theory that the set of all subjects evidencing adequate explanations on a Piagetian task is a proper subset of all subjects who possess the structure which the task assesses. (p. 177)

In general, then, it does not appear to be valid to consider skill at verbal explanation a requisite part of formal operations. The possibility of a discrepancy between operational level and verbal skills has important implications for individuals with problems in oral expression. Such individuals would be likely to be judged as not formal operational if the assessment were based on their verbal explanations even if they would be judged formal operational by non-verbal criteria. Therefore my study, which this paper describes in part, compared learning disabled adolescents with oral expressive problems to non-learning-disabled adolescents on a formal operations task and in particular compared "non-verbal" performance with verbal explanations of the task.

The entire study involved 14 learning disabled and 17 non-learning-disabled 14- and 15-year-old subjects. This paper will compare the explanations of two of the subjects, one learning disabled and one non-learning-disabled, who are similar in age, IQ, and formal operations status according to the "non-verbal" measure.

The two subjects to be compared in this paper were freshmen at a high school in a middle-class suburb of Chicago. They were very close in age and IQ; the IQ score for the LD subject was taken from the performance scale of the Wechsler Intelligence Scales for Children. Through discussion with his teacher and the teacher's responses on a questionnaire, the learning disabled (LD) subject was determined to have a specific problem with oral expression but no comprehension problems (as were all LD subjects who participated in the larger study). Sensory and emotional problems were ruled out.

The non-learning-disabled (NLD) subject was selected at random, as were all NLD subjects, from students who performed in the average range on a standardized achievement test.

Each subject was tested separately. The task apparatus consisted of a set of ten rods which could be inserted (2 at a time) at a ninety degree angle into a board. The subjects were instructed in Part 1 to "find out what makes some of these rods bend more than others" by testing pairs of rods. There were four variables which determine rod bending: length, diameter, material, and weight placement. A rod pair test (unconfounded) was demonstrated by the experimenter.

Each subject first participated in Part 1 of the rods task with the experimenter. Then the subject was asked to explain the rods task to another person who had not been present in the first part.

This second person was brought into the testing room and her chair was turned around so that she would be unable to see the rods or the subject's actions. This was done to encourage maximum explicitness on the part of the subject.

The "non-verbal" criterion for formal operations used in the study was that 70% or more of the last 10 rod pair tests made during Part 1 must be unconfounded (i.e., all variables except for the one being tested must be held constant). (1) Both subjects met this criterion. Upon turning to the verbal behavior of the two subjects, however, major differences appear. I would like to discuss 2 of these differences in this paper: 1) use of cohesive devices, and 2) choice of text content. These particular topics were selected from the many aspects of text production discussed in the literature because they are relevant to the issue of expression of underlying skill. It will be demonstrated that adolescents with oral expressive language problems have more difficulty with text production in general, which results in texts which do not reflect underlying ability as effectively as the texts of non-learning-disabled adolescents.

Use of Cohesive Devices

In producing text, speakers typically attempt to organize their texts into unified wholes; if successful, their texts exhibit cohesion (Halliday and Hasan, 1976). Speakers may use a variety of cohesive devices to connect one sentence to another, and to relate each sentence to the overall theme. Such cohesive expressions may be termed connective devices. These devices can be used as keywords to pinpoint where a subject is tying his/her text together.

The LD and NLD subjects used connective devices differently to organize their texts. In making the transition from one rod pair test (episode) to another, the NLD subject used a variety of phrases which served to connect the episodes.

(1) And also to show that ... (NLD, 2.2) (2

(2) And ... another thing that has to do with ... its bendability ... (2.3)

(3) And the size of the rod also has something to do with it. (2.4)

These phrases, particularly the terms also and another thing, provide cohesion in that they relate each episode to the overall goal of the rods task, that of ascertaining what variables affect rod bending.

In contrast, the LD subject either fails to link successive episodes together or connects them only with and or then in two episodes:

(4) And there's a ... sorta long ... wooden--or ... metal one ... (LD, 2.2)

(5) Then there's a ... sorta long ... wooden one ... (2.3)

His other 4 episodes were not linked by connective devices of any type. Thus, the only connective devices used by the LD subject were and and then, which each appeared only once.

Choice of Text Content

Another way to capture differences in the subjects' texts is to examine the nature of the content of their texts. As several authors have noted (e.g., Grimes, 1975, 1978; Beaugrande and Dressler, 1981), different types of discourse have distinctive requirements for content. For the purposes of this paper I will distinguish between narrative texts on the one hand, and explanatory texts on the other. (3) In narrative texts, the primary purpose is to describe events, participants and settings; explanations and comments may be offered as well, but these play a secondary role (Grimes, 1975, 1978). The primary goal in explanatory texts is, as the name suggests, to explain something; they may contain narrative sequences which serve to illustrate what is being explained (Grimes, 1975). In the present study, it was expected that the subjects would produce explanatory texts, and use their narrations of rod pair tests as illustration. That is, the rod tests made would be related to the overall theme of rod flexibility and an emphasis would be placed on what is learned from each test. It would also be possible to interpret the task as a narrative one and to produce a

text which was primarily a narration of one's actions, i.e., of what rods one was testing at the moment and which rod was bending more.

In comparing the relative proportions of narrative to explanatory statements in the subjects' texts, we see that the NLD subject produces a text which is consistent with an explanatory format, while the LD subject produces a narrative text. The NLD subject began with a statement of the purpose for his first test:

(6) First I prove that ... two different ... materials has to do with the bendability of it ... (NLD, 2.1)

If we look at examples 1, 2, and 3 again, we see that these are also explanatory statements.

The LD subject begins with no statement of purpose, beginning instead with a description of the rods he will test:

(7) All right, this is a ... puttin' one in that's ... real long ... and skinny ... (LD, 2.1)

This subject concludes episodes only by reporting the results of the rod pair tests, by referring to the specific rods used:

(8) ... and uh ... the long wood one ... bends farther down than the short plastic one ... (LD, 2.1)

(9) The ... plastic one ... bends farther than the metal one ... (2.2)

The LD subject produced no statements which could be categorized as explanatory.

In addition to reporting pair test results, the NLD subject ended two of his episodes with a conclusion:

(10) So that shows that what they're made of ... affects it ... its bendability. (NLD, 2.1)

(11) So that has to do with length. Of the rod ... (2.3)

These conclusions extend the results of particular tests to general principles of rod flexibility.

Thus we see that the NLD subject began each episode and concluded two of his five episodes with explanatory statements about the overall significance of his tests, which served to relate each test to the overall goal of the task. He also consistently related adjacent episodes to one another with connective devices. The LD subject gave only a narration of his rod pair tests, with little relating of one episode to another or to the overall task goal. These differences are representative of the differences found between the formal operational LD and NLD groups in general; the NLD group produced a significantly higher proportion of explanatory statements and used a significantly greater variety of connective devices. (See Schneider, in preparation for a fuller discussion of these results.)

Conclusions

We have seen that two subjects who meet a "non-verbal" criterion for formal operations can differ greatly in the way in which they explain the task. The majority of the LD subject's tests were unconfounded, and nothing in his explanation indicated a "false positive" result (i.e., that his unconfounded tests were accidental or based on false premises). However, while the NLD subject produced a cohesive explanatory text, the LD subject produced a series of narrative statements, not cohesively tied, which did not convey the relation of his activity to the overall task goal to the same degree as did the text of the NLD subject. It has been suggested elsewhere (Podhajski, 1980; Caro and Schneider, in press) that learning disabled children rely on the extralinguistic content in producing oral texts more than do non-disabled children, whether or not this reliance is appropriate for the production of a maximally comprehensible text. The tendency to depend on extralinguistic rather than intralinguistic factors is consistent with the production of a narrative rather than an explanatory text -- that is, if a subject were depending heavily on the task apparatus and his own actions to structure his text, the most likely result would be a description of the apparatus and actions rather than explanations derived from them. Thus the LD subject's production of a narrative text may be a result of his dependence on the extralinguistic context in the production of his text.

The fact that the LD subject did not make explanatory statements might be interpreted by an examiner as reflecting an inability to make generalizations (either aloud or privately) about the task. The fact that the LD subject made unconfounded tests significantly beyond the chance level, however, indicates that he was choosing his tests according to a generalization of what constitutes a valid test (Piaget's "control-of-variables" or "all things being equal" schema). If we view his performance as the result of carrying out the task as a narrative rather than an explanatory one, we see that we are not justified in assuming a failure to generalize, but only in noting a failure to express generalizations verbally. Similarly, a failure to relate rod test results to an overall theme could lead to a judgment by an examiner of a lack of organization or systematicity on the part of the subject. Rather than reflecting a lack of formal operations skills, however, the verbal performance of the LD subject should be considered as part of a more general problem with text-structuring devices -- either as a lack of command of or a failure to use the linguistic devices which would reflect these formal operations skills.

Evidence from a related study (partially reported in Caro and Schneider, in press) supports the claim that the LD subjects had difficulty with text production independent of their formal operational level. The 31 subjects from the study described in this paper were also given a narration task, in which they were required

to tell stories which they had just seen on a videotape to someone who had never seen the stories. The texts of both the rods task and the narration task were examined for appropriateness of the first mentions of all referents (see Caro and Schneider for a more complete procedural description). In both tasks the NLD subjects produced a significantly greater proportion of appropriate first-mention terms. This provides further evidence that the LD subjects had difficulty with a range of text production skills.

Footnotes

1. Given the array of rods used, the probability of making 7 or more unconfounded tests in 10 tries was at the .01 level (Korin, 1975); therefore 70% or better was chosen as the non-verbal criterion.

2. In the examples, ... indicates hesitation, -- indicates a false start, and [...] indicates that some text from the transcript has not been included in the example. The numbers (e.g., 2.2) indicate the part of the test session (all the examples in this paper are from Part 2) and the episode the example is from.

3. This distinction is based on Grimes' discussions of narrative versus "non-sequential" (1975) or "logical-sounding" (1978) discourse.

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